

CR70

“Beam Builder”

**Universal CRT
Analyzer & Restorer**

Schematic & Parts List

SENCORE

3200 Sencore Drive, Sioux Falls, South Dakota 57107

SCHEMATIC REFERENCE	PART NO.	DESCRIPTION
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Function Board (300 Board)

R1	14C1-104	Resistor,100K,¼W,5%
R2	14C1-473	Resistor,47K,¼W,5%
R3	14C29-2760	Resistor,2.76 ohm,½W,1%
SW7	25A361	Switch,9P11P PC mount

Rejuve Board (400 Board)

R1	14A52-11	Resistor,10 ohm,10W,wire wound
R2	14B49-10	Resistor,1K,5W,10W,wire wound
SW9	25A300-2	Switch,push button,4P2T
SW8	25A324	Switch,push button,2P2T

Chassis Mounted Components

IC1	69G212	IC, LM 317T,Adj. voltage reg.
TR1	19A69	Transistor,2N2955
TR2	19A24	Transistor,2N3055
R1-3	14C4-302	Resistor,3K,½W,5%
R4	14C4-513	Resistor,51K,½W,5%
C1	24G421	Capacitor,Lytic,100UF,450V
SW12	25A212	Switch,rotary,4 Pos,Bias
SW13	25A362	Switch,power, ON/OFF
T1	28A89	Transformer,power
M1	23G76	Meter,4",100uA
NE-1	20G7	Neon indicator
	21G92	Knob,bar with indicator line
	63A30	Lens skirt for knob
	27G14	Line cord

Assemblies

	110D475	CR70 case
	126G288	Tester cable
	143B324	Main board (100)
	143B317	Switch board (200)
	143B318	Function board (300)
	143B323	Rejuve board (400)

Miscellaneous

	69G95	Latch, squeeze release
	139A165	Socket Adapter, 1&2
	139A166	Socket Adapter, 3&4
	139A167	Socket Adapter, 5&6
	139A168	Socket Adapter, 7&8
	139A169	Socket Adapter, 9&10
	139A170	Socket Adapter, Universal

Components not listed are standard replacement parts and may be purchased locally. When ordering parts, please specify the instrument model number, schematic reference, part number, and description of the parts required. Parts orders will be shipped C.O.D. unless remittance accompanies order. Parts prices may be obtained by calling Service Dep't. Parts at 605-339-0100. Minimum billing on parts orders is \$5.00.

**SCHEMATIC
REFERENCE**

PART NO.

DESCRIPTION

Main Board (100 Board)

IC1	69G107	IC,REG,+15V,100MA,78L15
IC2	69G108	IC,REG,-15V,100MA,79L15
IC3,7	69G63	IC,TL081,BiFET Op-Amp
IC4	69G46	IC,Quad BiFET Op-Amp
IC5	69G7A	IC,CMOS Quad 2-Input NOR
IC6	69G8B	IC,CMOS,Dual"D",Flip-Flop
TR1,2	19A33-1	Transistor,NPN, 2N3904
CR1,2,3,4	16G5	Diode,Silicon,1.0A,1N4006
CR5,7,10	16G10	Diode,Silicon,1.0A,1N4004
CR6	50C4-9	Diode,zener,68V,1N4760A
CR8,21	50C4-11	Diode,zener,15V,1N4744A
CR9	50C4-6	Diode,zener,6.2V,1N4735
CR11-17, 19,20	50C5-2	Diode,1N4148
CR18	50C3-1	Diode,1N34A
R18	15C7-6	Control,500K,PC mount
R23	15C7-11	Control,50K,PC mount
R24	15C7-2	Control,10K,PC mount
R34,35	15C7-7	Control,5M,30%,PC mount
R4	14C1-392	Resistor,3.9K,¼W,5%
R5	14C29-5003A	Resistor,5K,½W,1%
R6	14C29-1505	Resistor,150K,½W,1%
R7	14C29-18753	Resistor,1.875K,½W,1%
R8,9,10,30, 31,36	14C1-103	Resistor,10K,¼W,5%
R11	14C8-184	Resistor,180K,1W,10%
R12	14C4-392	Resistor,3.9K,¼W,5%
R13,17	14B49-9	Resistor,150 ohm,5W,wire wound
R14	14B49-12	Resistor,500 ohm,5W,wire wound
R15	14C1-275	Resistor,2.7M,¼W,5%
R19	14C1-154	Resistor,150K,¼W,5%
R20	14C30-2703	Resistor,2.7K,½W,2%
R21	14C29-3903	Resistor,3.9K,½W,1%
R22	14C1-822	Resistor,8.2K,¼W,5%
R25	14C1-682	Resistor,6.8K,¼W,5%
R26	14C1-823	Resistor,82K,¼W,5%
R27	14C1-623	Resistor,62K,¼W,5%
R28,32	14C1-104	Resistor,100K,¼W,5%
R29	14C1-274	Resistor,270K,¼W,5%
R33	14C4-225	Resistor,2.2M,½W,5%
R37	14C1-101	Resistor,100 ohm,¼W,5%
R43,44,45	14C1-474	Resistor,470K ¼W,5%
R46	14C1-153	Resistor,15K,¼W,5%
C1,2,3,4,5	24G170	Capacitor,Lytic,10uF,300V,10%
C6,7	24G252	Capacitor,Lytic,200uF,50V,+80/-20%
C8,9	24G104	Capacitor,Disc,.1uF,100V,+80/-20%
C10,20,21	24G384	Capacitor,Lytic,2.2uF,50V,20%
C11,18	24G59	Capacitor,Disc,.05uF,100V,+80/-20%
C12	24G208	Capacitor,Disc,150pF,500V,10%
C13	24G119	Capacitor,Disc,470pF,500V,10%
C14	24G428	Capacitor,Lytic,10uF,450V
C15,16,17	24G334	Capacitor,Tant,2uF,16V,20%
C19	24G312	Capacitor,Lytic,50uF,15V,+80/-20%
C22	24G207	Capacitor,Disc,.01uF,100V,+80/-20%
L1	41G3	Relay,1A5AHH-X,5V,SPST

**SCHEMATIC
REFERENCE**

PART NO.

DESCRIPTION

Switch Board (200 Board)

SCHEMATIC REFERENCE	PART NO.	DESCRIPTION
IC2	69G13	IC,LM324,Quad Op-Amp
TR3	19A34-1	Transistor,PNP,2N3906
TR4,5	19A33-1	Transistor,NPN, 2N3904
CR1,2	50C5-2	Diode,1N4148
CR3,4,5,6, 7,8	50C4-9	Diode,zener,68V,1N4760A
CR9	50C4-2	Diode,zener,8.2V,1N4738
CR10,11,12 13	16G14	Diode,1N5401
CR14	16G10	Diode,silicon,1.0A,1N4001
CR15	16G25	Diode,3A,600PIV,1N5405
CR16	50C4-8	Diode,zener,20V,5%,1N4747
MOV1,2,3,4	33G251	Varistor,390V,±10%
R1	15A27-4	Control,20K,trimmer
R11	15A33-1	Control,150K,PC mount
R37	15A27-3	Control,1K,trimmer
R30	15A33-2	Control,30K,PC mount
R2	14A38-1305	Resistor,130K,¼W,1%
R3	14C4-152	Resistor,1.5K,½W,5%
R5	14A89	Resistor,56K,7W,5%
R6	14C1-752	Resistor,7.5K,¼W,5%
R4,7	14C1-244	Resistor,240K,¼W,5%
R8	14C1-165	Resistor,1.6M,¼W,5%
R9	14C1-205	Resistor,2M,¼W,5%
R10	14C1-104	Resistor,100K,¼W,5%
R12	14A38-3322	Resistor,332 ohm,¼W,1%
R13	14A38-1692	Resistor,169 ohm,¼W,1%
R14	14A38-4992	Resistor,449 ohm,¼W,1%
R15,17,20, 21,22,23	14A38-1003	Resistor,1K,¼W,1%
R16	14A38-3003	Resistor,3.0K,¼W,1%
R18,19	14A38-2003	Resistor,2K,¼W,1%
R24	14C1-221	Resistor,220 ohm,¼W,5%
R25	14A53-3	Resistor,.56 ohm,½W,5%
R26	14C1-241	Resistor,240 ohm,¼W,5%
R27	14C1-153	Resistor,15K,¼W,5%
R28	14C1-201	Resistor,200 ohm,¼W,5%
R29	14C1-203	Resistor,20K,¼W,5%
R31	14C1-243	Resistor,24K,¼W,5%
R32	14C1-511	Resistor,510 ohm,¼W,5%
R33	14C10-102	Resistor,1K,2W,5%
R36	14B49-34	Resistor,1 ohm,5W,5%
R38	14C1-106	Resistor,10M,¼W,5%
R39	14C1-331	Resistor,330 ohm,¼W,5%
R40	14C1-223	Resistor,22K,¼W,5%
R42	14C1-106	Resistor,10M,¼W,5%
C1	24G473	Capacitor,Lytic,2200uF,35V,10%
C2	24G407	Capacitor,Lytic,47uF,25V,+50/4%
C3	24G22	Capacitor,Disc,330pF,1000V,10%
SW1-3	25A356	Swich,1P14P,PC mount
SW4,5	25A357	Swich,1P14P,PC mount
SW6	25A358	Swich,1P9P,PC mount
SW10	25A359	Swich,2P3P,PC mount
SW11	25A360	Swich,4P3P,PC mount

SCHEMATIC
REFERENCE

PART NO.

DESCRIPTION

Main Board (100 Board)

IC1	69G107	IC,REG,+15V,100MA,78L15
IC2	69G108	IC,REG,-15V,100MA,79L15
IC3,7	69G63	IC,TL081,BiFET Op-Amp
IC4	69G46	IC,Quad BiFET Op-Amp
IC5	69G7A	IC,CMOS Quad 2-Input NOR
IC6	69G8B	IC,CMOS,Dual'D',Flip-Flop
TR1,2	19A33-1	Transistor,NPN, 2N3904
CR1,2,3,4	16G5	Diode,Silicon,1.0A,1N4006
CR5,7,10	16G10	Diode,Silicon,1.0A,1N4004
CR6	50C4-9	Diode,zener,68V,IN4760A
CR8,21	50C4-11	Diode,zener,15V,1N4744A
CR9	50C4-6	Diode,zener,6.2V,1N4735
CR11-17, 19,20	50C5-2	Diode,1N4148
CR18	50C3-1	Diode,1N34A
R18	15C7-6	Control,500K,PC mount
R23	15C7-11	Control,50K,PC mount
R24	15C7-2	Control,10K,PC mount
R34,35	15C7-7	Control,5M,30%,PC mount
R4	14C1-392	Resistor,3.9K, 1/4W,5%
R5	14C29-5003A	Resistor,5K, 1/2W,1%
R6	14C29-1505	Resistor,150K, 1/2W,1%
R7	14C29-18753	Resistor,1.875K, 1/2W,1%
R8,9,10,30, 31,36	14C1-103	Resistor,10K, 1/4W,5%
R11	14C8-184	Resistor,180K,1W,10%
R12	14C4-392	Resistor,3.9K, 1/2W,5%
R13,17	14B49-9	Resistor,150 ohm,5W,wire wound
R14	14B49-12	Resistor,500 ohm,5W,wire wound
R15	14C1-275	Resistor,2.7M, 1/4W,5%
R19	14C1-154	Resistor,150K, 1/4W,5%
R20	14C30-2703	Resistor,2.7K, 1/2W,2%
R21	14C29-3903	Resistor,3.9K, 1/2W,1%
R22	14C1-822	Resistor,8.2K, 1/4W,5%
R25	14C1-682	Resistor,6.8K, 1/4W,5%
R26	14C1-823	Resistor,82K, 1/4W,5%
R27	14C1-623	Resistor,62K, 1/4W,5%
R28,32	14C1-104	Resistor,100K, 1/4W,5%
R29	14C1-274	Resistor,270K, 1/4W,5%
R33	14C4-225	Resistor,2.2M, 1/2W,5%
R37	14C1-101	Resistor,100 ohm, 1/4W,5%
R43,44,45	14C1-474	Resistor,470K 1/4W,5%
R46	14C1-153	Resistor,15K, 1/4W,5%
C1,2,3,4,5	24G170	Capacitor,Lytic,10uF,300V,10%
C6,7	24G252	Capacitor,Lytic,200uF,50V,+80/-20%
C8,9	24G104	Capacitor,Disc,.1uF,100V,+80/-20%
C10,20,21	24G384	Capacitor,Lytic,2.2uF,50V,20%
C11,18	24G59	Capacitor,Disc,.05uF,100V,+80/-20%
C12	24G208	Capacitor,Disc,150pF,500V,10%
C13	24G119	Capacitor,Disc,470pF,500V,10%
C14	24G428	Capacitor,Lytic,10uF,450V
C15,16,17	24G334	Capacitor,Tant,2uF,16V,20%
C19	24G312	Capacitor,Lytic,50uF,15V,+80/-20%
C22	24G207	Capacitor,Disc,.01uF,100V,+80/-20%
L1	41G3	Relay,1A5AHH-X,5V,SPST

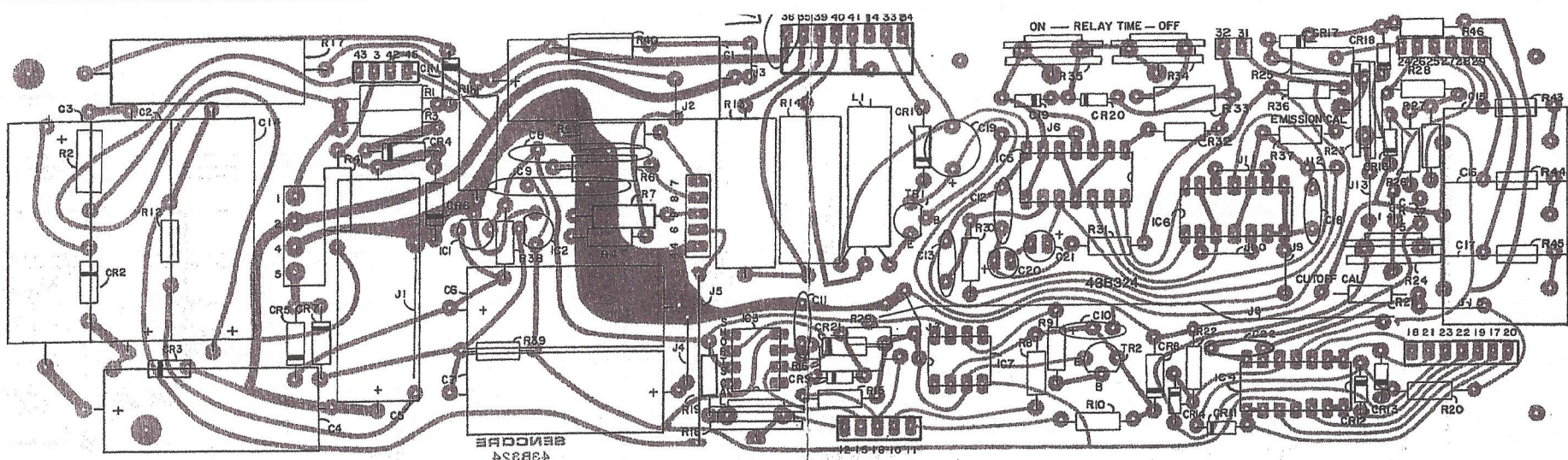
SCHEMATIC
REFERENCE

PART NO.

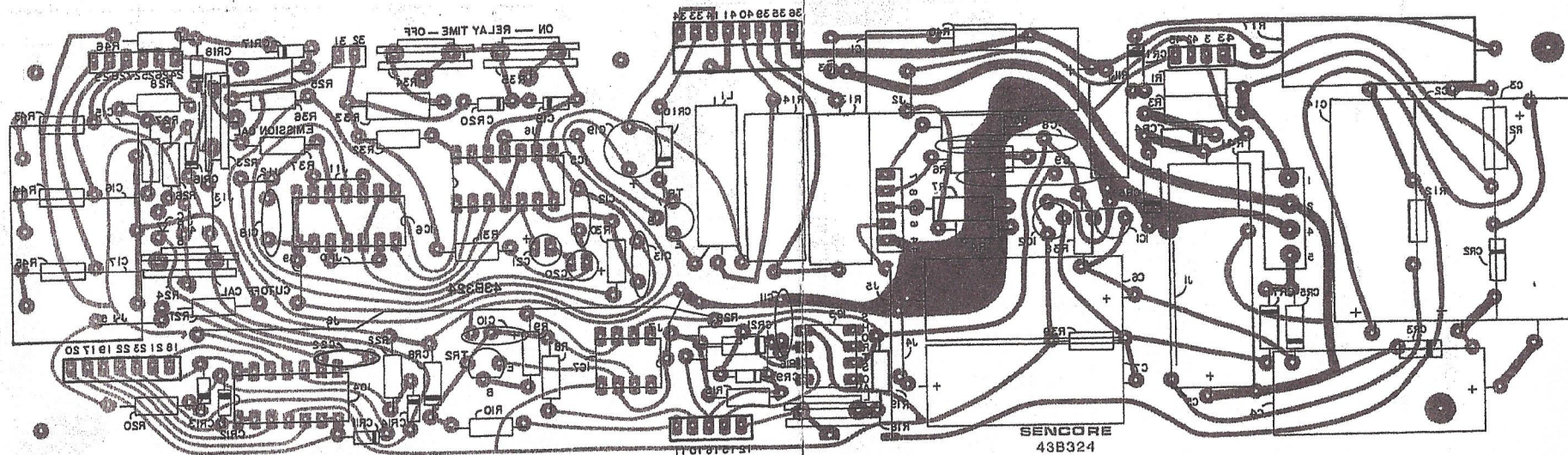
DESCRIPTION

Switch Board (200 Board)

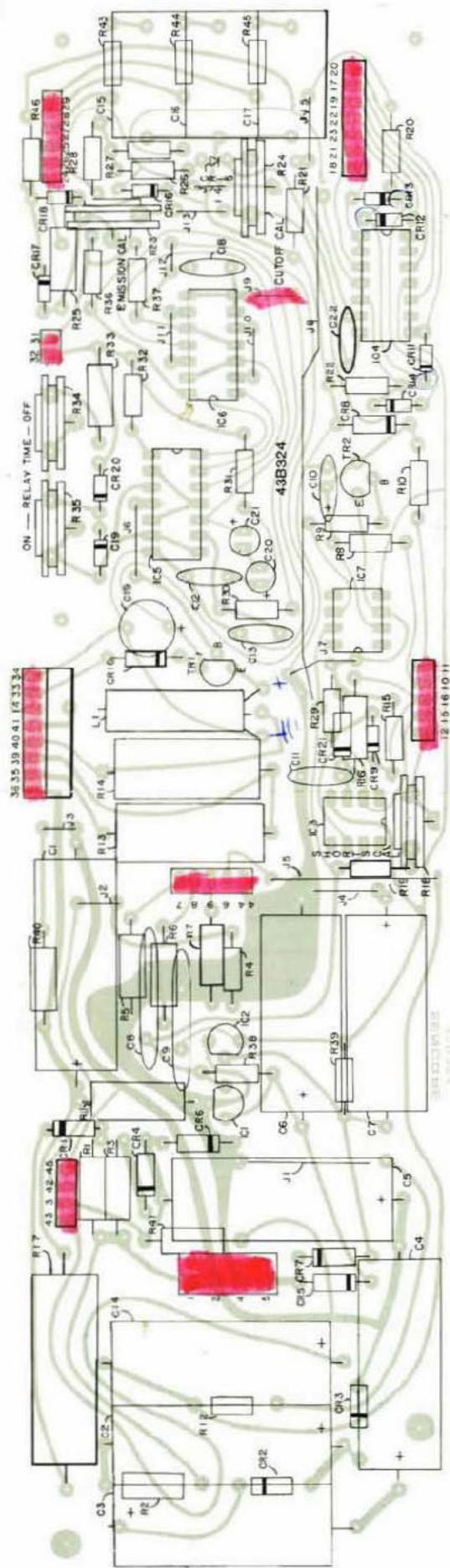
IC2	69G13	IC,LM324,Quad Op-Amp
TR3	19A34-1	Transistor,PNP,2N3906
TR4,5	19A33-1	Transistor,NPN, 2N3904
CR1,2	50C5-2	Diode,1N4148
CR3,4,5,6, 7,8	50C4-9	Diode,zener,68V,IN4760A
CR9	50C4-2	Diode,zener,8.2V,1N4738
CR10,11,12 13	16G14	Diode,1N5401
CR14	16G10	Diode,silicon,1.0A,1N4001
CR15	16G25	Diode,3A,600PIV,1N5405
CR16	50C4-8	Diode,zener,20V,5%,IN4747
MOV1,2,3,4	33G251	Varistor,390V,±10%
R1	15A27-4	Control,20K,trimmer
R11	15A33-1	Control,150K,PC mount
R37	15A27-3	Control,1K,trimmer
R30	15A33-2	Control,30K,PC mount
R2	14A38-1305	Resistor,130K, 1/4W,1%
R3	14C4-152	Resistor,1.5K, 1/2W,5%
R5	14A89	Resistor,56K,7W,5%
R6	14C1-752	Resistor,7.5K, 1/4W,5%
R4,7	14C1-244	Resistor,240K, 1/4W,5%
R8	14C1-165	Resistor,1.6M, 1/4W,5%
R9	14C1-205	Resistor,2M, 1/4W,5%
R10	14C1-104	Resistor,100K, 1/4W,5%
R12	14A38-3322	Resistor,332 ohm, 1/4W,1%
R13	14A38-1692	Resistor,169 ohm, 1/4W,1%
R14	14A38-4992	Resistor,449 ohm, 1/4W,1%
R15,17,20, 21,22,23	14A38-1003	Resistor,1K, 1/4W,1%
R16	14A38-3003	Resistor,3.0K, 1/4W,1%
R18,19	14A38-2003	Resistor,2K, 1/4W,1%
R24	14C1-221	Resistor,220 ohm, 1/4W,5%
R25	14A53-3	Resistor,.56 ohm, 1/2W,5%
R26	14C1-241	Resistor,240 ohm, 1/4W,5%
R27	14C1-153	Resistor,15K, 1/4W,5%
R28	14C1-201	Resistor,200 ohm, 1/4W,5%
R29	14C1-203	Resistor,20K, 1/4W,5%
R31	14C1-243	Resistor,24K, 1/4W,5%
R32	14C1-511	Resistor,510 ohm, 1/4W,5%
R33	14C10-102	Resistor,1K,2W,5%
R36	14B49-34	Resistor,1 ohm, 5W,5%
R38	14C1-106	Resistor,10M, 1/4W,5%
R39	14C1-331	Resistor,330 ohm, 1/4W,5%
R40	14C1-223	Resistor,22K, 1/4W,5%
R42	14C1-106	Resistor,10M, 1/4W,5%
C1	24G473	Capacitor,Lytic,2200uF,35V,10%
C2	24G407	Capacitor,Lytic,47uF,25V,+50/4%
C3	24G22	Capacitor,Disc,330pF,1000V,10%
SW1-3	25A356	Swich,1P14P,PC mount
SW4,5	25A357	Swich,1P14P,PC mount
SW6	25A358	Swich,1P9P,PC mount
SW10	25A359	Swich,2P3P,PC mount
SW11	25A360	Swich,4P3P,PC mount



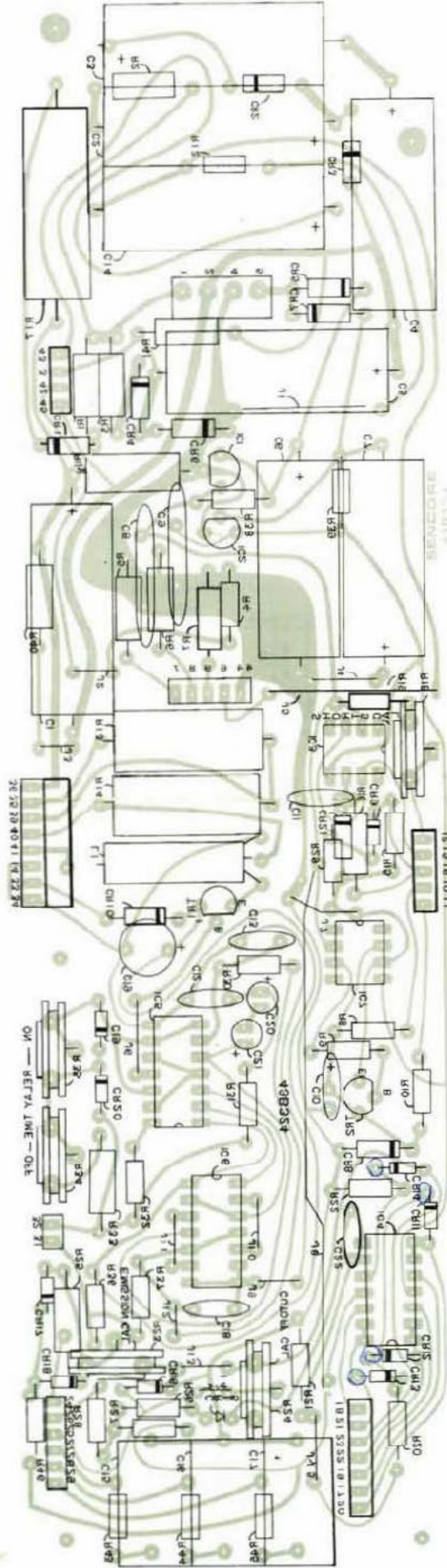
"100" MAIN BOARD COMPONENT VIEW



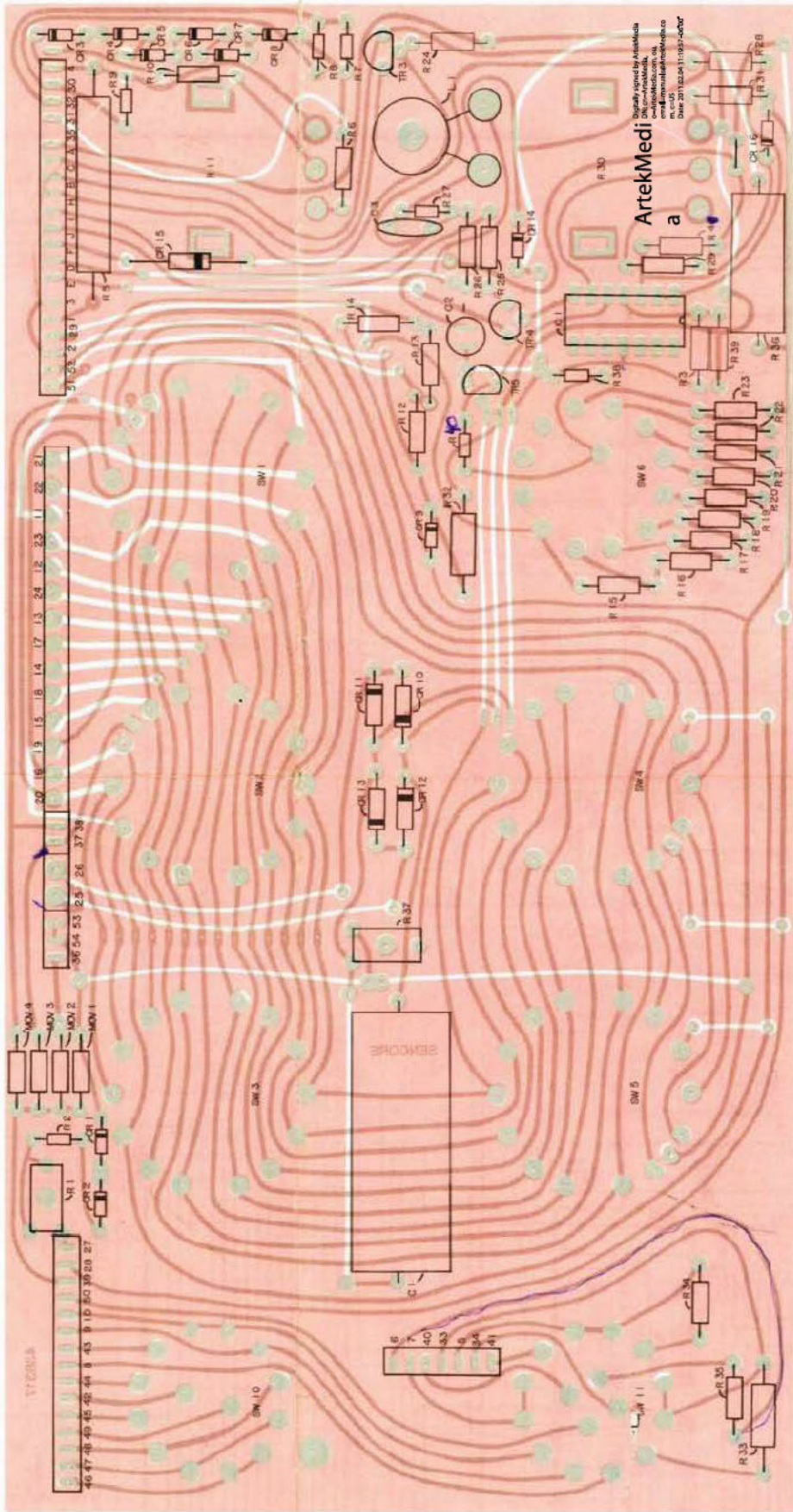
"100" MAIN BOARD FOIL VIEW



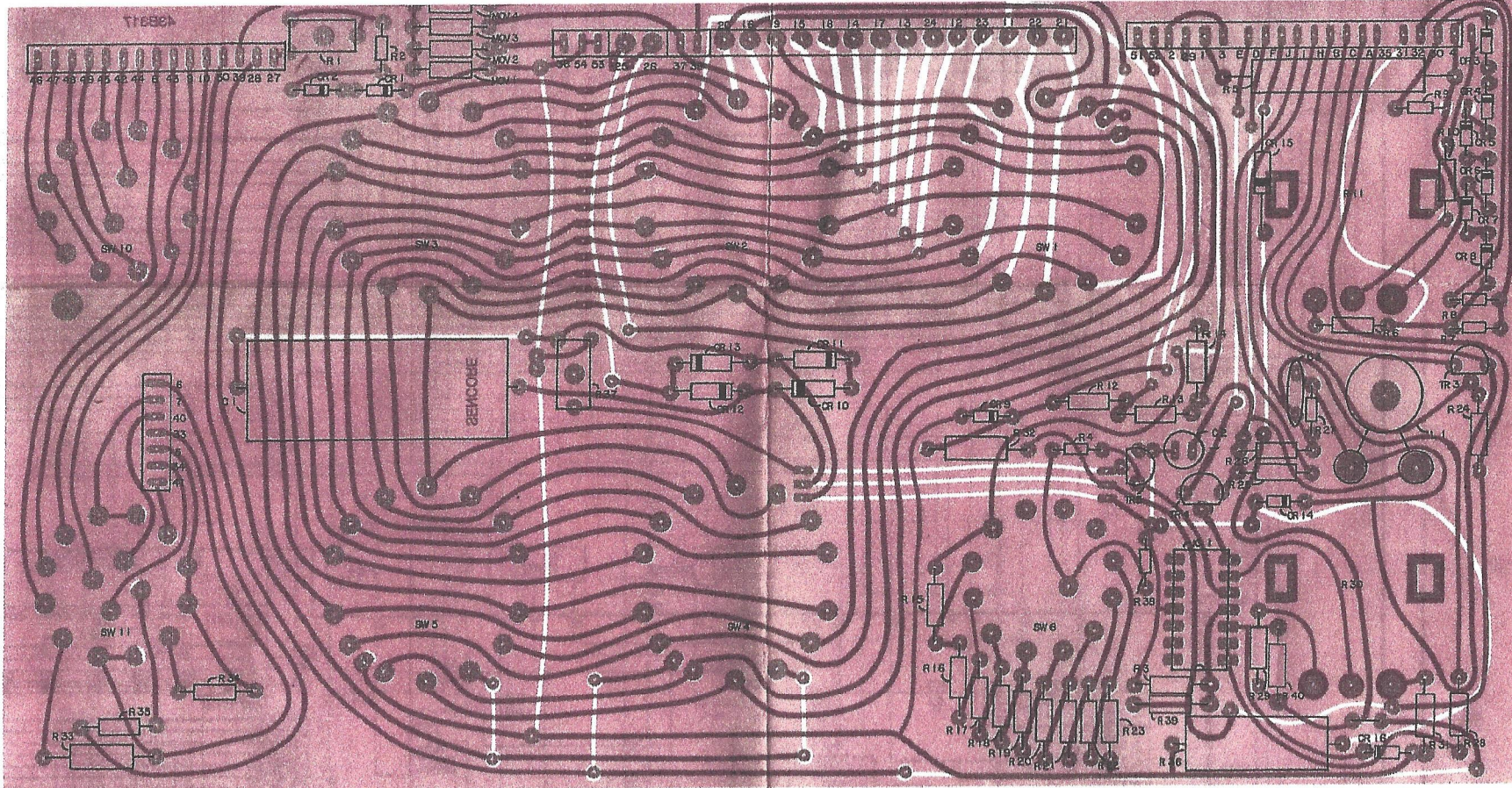
"100" MAIN BOARD COMPONENT VIEW



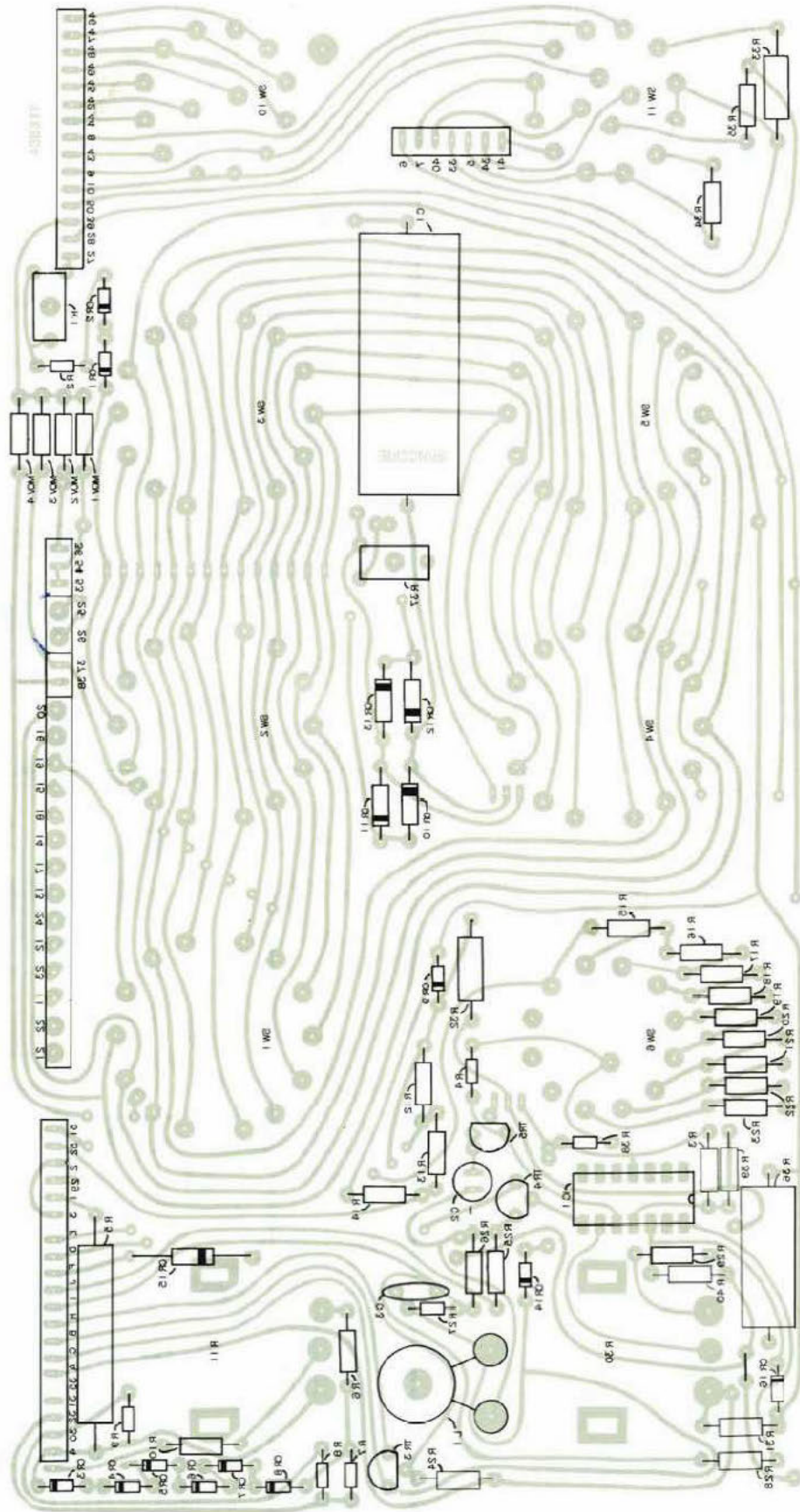
"100" MAIN BOARD FOIL VIEW



“200” SWITCH PC BOARD COMPONENT VIEW

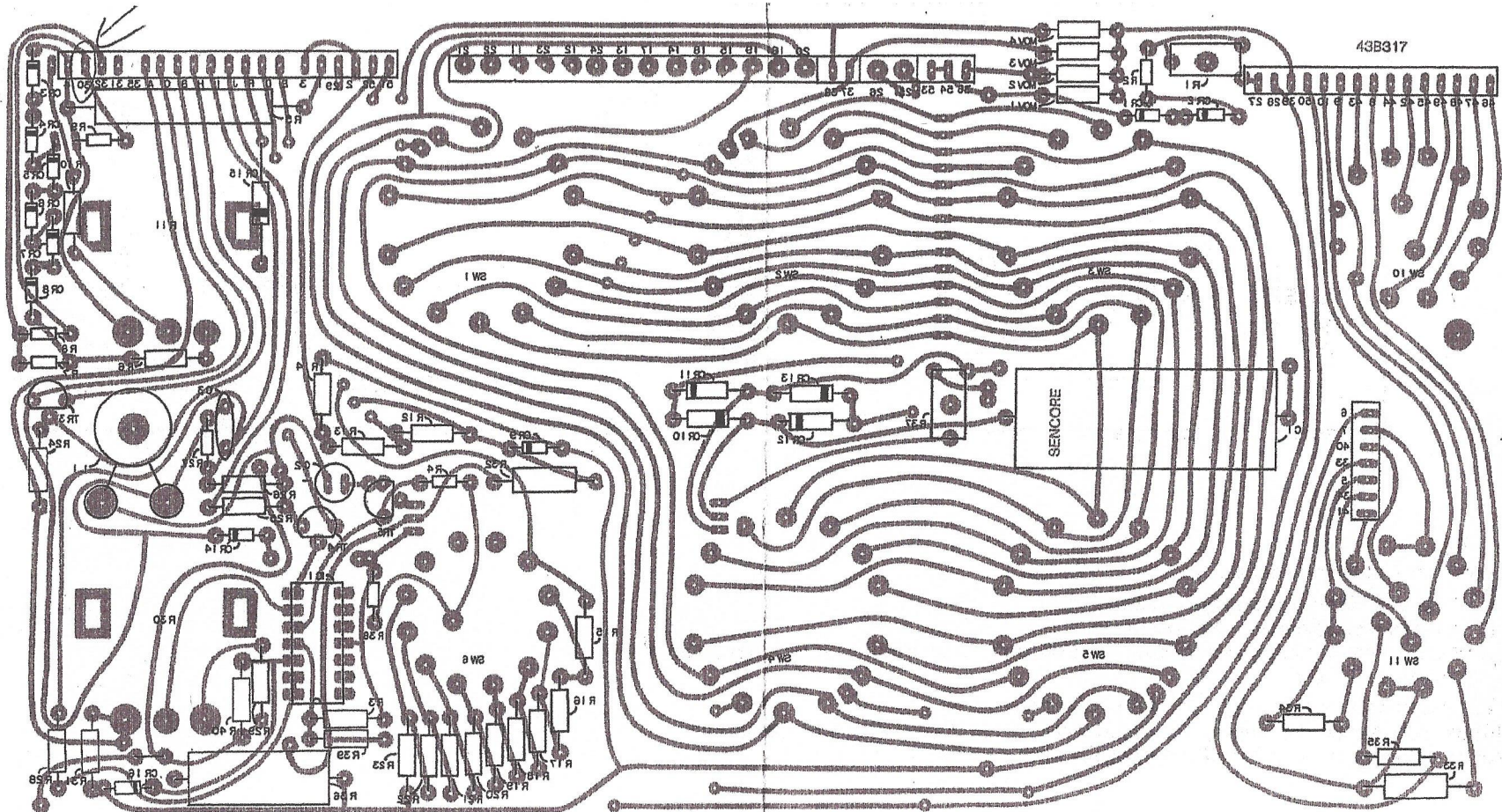


"200" SWITCH PC BOARD COMPONENT VIEW



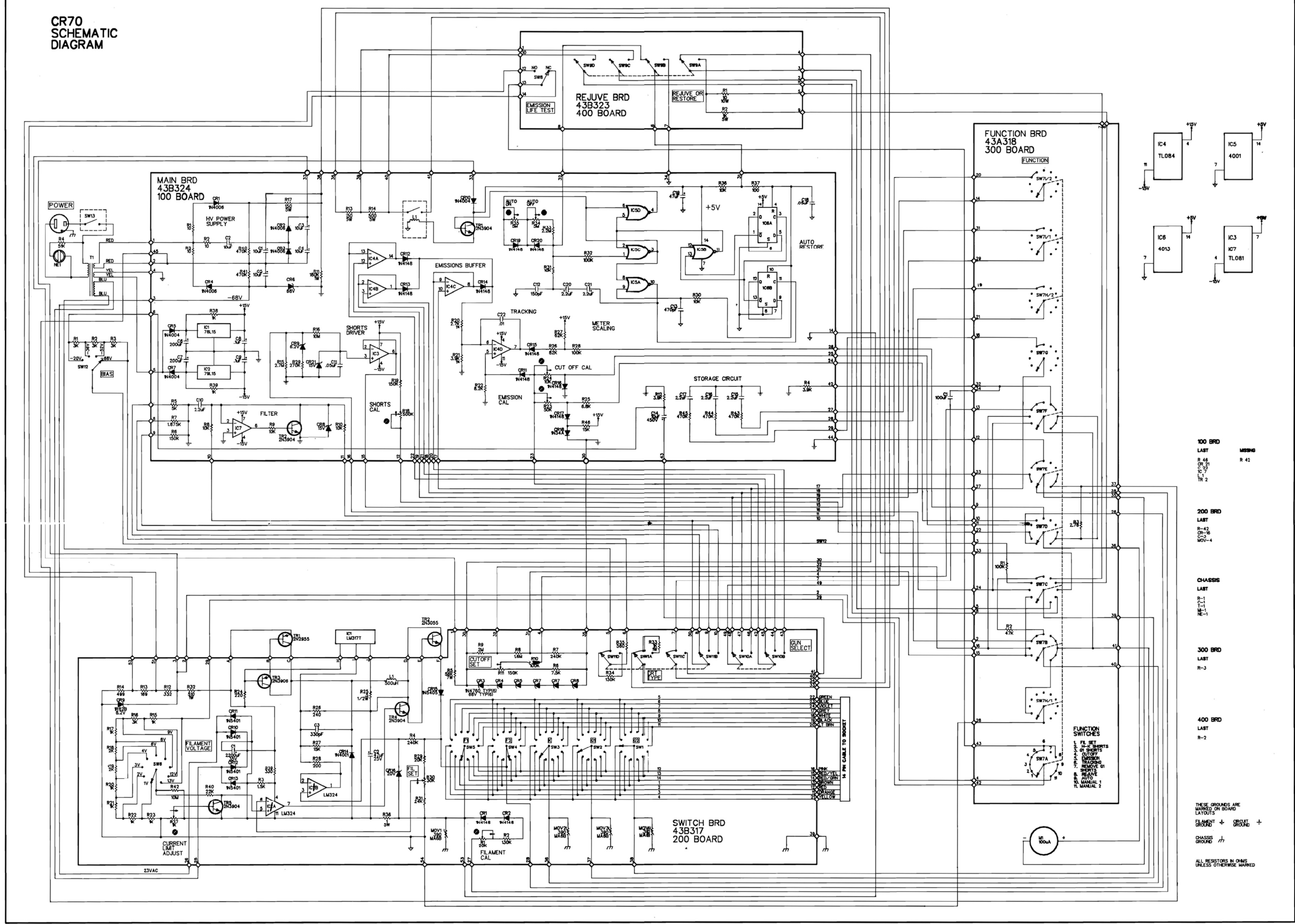
“200” SWITCH PC BOARD FOIL VIEW

43B317



"200" SWITCH PC BOARD FOIL VIEW

**CR70
SCHEMATIC
DIAGRAM**



100 BRD
LAST
R 46
C 7
R 2

200 BRD
LAST
R 42
C 7
MOV-4

CHASSIS
LAST
R 1
R 1

300 BRD
LAST
R-3

400 BRD
LAST
R-2

THESE GROUNDS ARE
MARKED ON BOARD
LAYOUTS
FILAMENT GROUND +
CHASSIS GROUND

ALL RESISTORS IN OHMS
UNLESS OTHERWISE MARKED

- NOTES:**
- Board interconnection notes:
 - denotes a single push-on type connector.
 - denotes wire soldered to PC board.
 - ◇ denotes moxlex connection. Numbers inside or along side indicate the pin number of the plug-in connector.
 - Calibration control note: ⊖ indicates internal control.
 - All controls, jacks, and displays on exterior of unit are shown with box around the name.
 - Arrow on slider of controls indicates the clockwise rotation of the control.